

APPENDIX J

GREEN REMEDIATION STRATEGY

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BASIS OF DESIGN REPORT

JORGENSEN FORGE EARLY ACTION AREA

Prepared for

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

On behalf of

Earle M. Jorgensen Company
10650 South Alameda Street
Lynwood, California 90262

Jorgensen Forge Corporation
8531 East Marginal Way South
Seattle, Washington 98108

Prepared by

Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, Washington 98101

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TABLE OF CONTENTS

1	BACKGROUND	1
1.1	Green Remediation Regulatory Framework – Policies and Guidance Documents.....	2
1.1.1	EPA Superfund Green Remediation Strategy	2
1.1.2	EPA OSWER Policy: Principles for Greener Cleanups	3
1.2	EPA Region 10: Green and Clean Policy	4
1.3	Footprint Evaluation and Reduction Methodology	5
1.3.1	Core Elements of Green Remediation.....	5
1.3.2	Methodology for Understanding and Reducing a Project’s Environmental Footprint	6
1.3.3	Other Guidance Documents	6
1.4	Green Remediation Approach for the Jorgensen Forge Early Action Area	7
2	REFERENCES	11

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Administrative Settlement Agreement and Order on Consent for Removal Action Implementation
BMP	best management practice
BODR	Basis of Design Report
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
EAA	Early Action Area
EMJ	Earl M. Jorgensen Company
EMS	Environmental Management System
EO	Executive Order
EMJ	Earl M. Jorgensen
EPA	U.S. Environmental Protection Agency
FFEO	Federal Facilities Enforcement Office
FFRRO	Federal Facilities Restoration and Reuse Office
FS	Feasibility Study
GHG	greenhouse gas
hp	horse power
Jorgensen Forge	Jorgensen Forge Corporation
NCP	National Contingency Plan
NTCRA	non-time-critical removal action
OEM	Office of Emergency Management
OSRE	Office of Site Remediation Enforcement
OSRTI	Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
Owner	EMJ and Jorgensen Forge
RAO	remedial action objectives
RM	river mile
SOW	Statement of Work

1 BACKGROUND

This Green Remediation Strategy was prepared on behalf of Earle M. Jorgensen Company (EMJ) and Jorgensen Forge Corporation (Jorgensen Forge; herein referred to collectively as the Owner), pursuant to the Administrative Settlement Agreement and Order on Consent for Removal Action Implementation (AOC; U.S. Environmental Protection Agency [EPA] Region 10 Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Docket No. 10-2012-0032) and attached Statement of Work (SOW). This Green Remediation Strategy is an appendix to the Basis of Design Report (BODR) Final Design submittal for the cleanup of contaminated sediments and associated bank soils in a portion of the Lower Duwamish Waterway (LDW) Superfund Site that is adjacent to the Jorgensen Forge facility (Facility), which is located in Tukwila, King County, Washington (see Figure 1 of the BODR; Jorgensen Forge Early Action Area [EAA]). The cleanup will be conducted as a non-time-critical removal action (NTCRA) in accordance with EPA's selected cleanup alternative, as documented in the *Action Memorandum, Responsiveness Summary and Future Actions, Jorgensen Forge Early Action Area, 8531 East Marginal Way South, Seattle, Washington, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Order on Consent (EPA Docket No. CERCLA-10-2003-001)* (EPA 2011) and detailed in the *Final Engineering Evaluation/Cost Analysis [EE/CA]– Jorgensen Forge Facility, 8531 East Marginal Way South, Seattle, Washington* (Anchor QEA 2011). The Jorgensen Forge EAA is located near river miles (RMs) 3.6 to 3.7, on the east bank of the LDW.

Recognizing that site cleanup creates an environmental footprint of its own, the EPA's main objective of green remediation is to minimize this footprint and promote environmental stewardship during all phases of remedial actions. EPA defines green remediation as the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions. EMJ and Jorgensen Forge are committed to performing the NTCRA consistent with EPA's green remediation guidance, including the EPA Region 10 Clean and Green Policy. The remainder of this document summarizes the applicable elements of the green remediation guidance and policies, and elements that will be incorporated into the NTCRA.

1.1 Green Remediation Regulatory Framework – Policies and Guidance Documents

The green remediation guidance and policies developed by EPA are based on existing statutory and regulatory frameworks across all cleanup programs including CERCLA and National Contingency Plan (NCP), as well as on the EPA Strategic Plan, executive orders, other federal and state statutes, and regulations addressing green and sustainable practices, including the following:

- Energy Policy Act of 2005
- Energy Independence and Security Act 2007
- American Recovery and Reinvestment Act 2009
- Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy and Economic Performance*, 2009
- EO 13423, *Strengthening Federal Environmental, Energy and Transportation Management*, 2009

The development of a green remediation strategy is a continuously evolving process as guidance and policies are being developed in response to environmental obligations and commitment on the state and federal level, as well as in response to the rapid rise of awareness about and innovation of green remediation technologies and practices.

Guidance documents and policies were developed by EPA to promote greener approaches to remediation as discussed in the following subsection.

1.1.1 EPA Superfund Green Remediation Strategy

The EPA Superfund green remediation strategy addresses policy and guidance development as well as resource development and program implementation and evaluation. Its goal is to promote green remediation practices for cleanups without compromising cleanup goals and objectives.

A green remediation primer called *Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites* was published by the EPA in 2008 (EPA 2008). This document provides an overview of green remediation as well as

establishes its core elements consisting of energy, air, water, land and ecosystems, materials and waste, and stewardship.

In September 2008, EPA formed the Superfund Green Remediation Workgroup chaired by the Office of Superfund Remediation and Technology Innovation (OSRTI) to develop policy and technical resources towards implementation of a green remediation strategy for cleanup actions. The workgroup includes the Office of Emergency Management (OEM), the Federal Facilities Restoration and Reuse Office (FFRRO), the Office of Site Remediation Enforcement (OSRE), the Federal Facilities Enforcement Office (FFEO), and Superfund Offices in Regions 1 through 10.

Two guidance documents that were developed by the EPA workgroup identify key actions to promote green remediation related to policy and guidance development, resource development and program implementation, and evaluation. The *Superfund Green Remediation Strategy* was first published in August 2009 (EPA 2009a), and the final strategy was published in September 2010 (EPA 2010) after public comment was received on the first document published in 2009. The final document includes an appendix with 30 key implementation actions to integrate green remediation principles into the Superfund program.

1.1.2 EPA OSWER Policy: Principles for Greener Cleanups

Until April 2012, EPA's website (<http://www.epa.gov/oswer/greencleanups/principles.html>; accessed on July 18, 2011) referenced the *Principles for Greener Cleanups* published in 2009 by the EPA Office of Solid Waste and Emergency Response (OSWER) as the current EPA policy for evaluating and minimizing the environmental footprint of remedial actions (EPA 2009b).

OSWER's policy (EPA 2009b) is consistent with existing laws and regulations requiring the following in cleanup actions:

- Protect human health and the environment
- Comply with all applicable laws and regulations
- Consult with communities regarding response action impacts consistent with existing

requirements

- Consider the following recommended five core elements of green remediation:
 - Total energy and renewable energy use
 - Air pollutants and greenhouse gas (GHG) emissions
 - Water use and impacts to water resources
 - Materials management and waste reduction
 - Land management and ecosystem protection

These core elements are applicable to all phases of work associated with a remedial action including site investigation; development of cleanup alternatives; and remedy design, construction, operation, and monitoring (EPA 2010).

1.2 EPA Region 10: Green and Clean Policy

Green remediation policies vary for the ten different EPA regions. Guidance and recommendations sharing common elements for incorporating green remediation principles into cleanup projects are in place in all of the ten EPA regions, but only Regions 2 and 10 require green remediation to be incorporated into cleanup projects.

Region 10 developed a “Green and Clean Policy” in 2009 applicable to all Superfund cleanup projects in the region with the goal to promote the application of green or sustainable practices and technologies to remedial actions. While this policy does not “fundamentally change how and why cleanup decisions are made” it “calls for more sustainable methods of implementing those cleanups” (EPA 2009c).

The main objectives of this policy are as follows:

- Protect human health and the environment by achieving remedial action goals
- Support sustainable human and ecological use and reuse of remediated land
- Minimize impacts to water quality and resources
- Reduce air toxics emissions and GHG production
- Minimize material use and waste production
- Conserve natural resources and energy

This policy details cleanup practices that are encouraged, consistent with other guidance documents addressing green remediation strategies, such as use of renewable energy and energy conservation, use of cleaner fuels and emissions reduction strategies, water conservation and efficiency, incorporation of sustainable site design, reuse and recycling of materials, support of GHG emissions reduction technology, and others (see *Region 10 Superfund, Resource Conservation and Recovery Act, Leaking Underground Storage Tanks, and Brownfields Clean and Green Policy*; EPA 2009c).

1.3 Footprint Evaluation and Reduction Methodology

1.3.1 Core Elements of Green Remediation

EPA's main objective of green remediation is to minimize project footprints and promote environmental stewardship during all phases of remedial actions. Five core elements of green remediation provide a framework for developing best management practices (BMPs) that can lead toward this objective. These core elements include:

1. **Total Energy and Renewable Energy Use:** Many Superfund cleanups involve energy-intensive technologies. Green remediation strategies focus on opportunities to reduce total energy use and increase the percentage of energy from renewable sources.
2. **Air and Atmosphere –Reducing Air Pollutants and GHG emissions:** Superfund cleanups may involve onsite and off-site emissions of GHG and air pollutants from treatment processes, operation of heavy machinery, and transportation of routine vehicles and cargo trucks. These emissions may be reduced by applying the most appropriate advanced technologies and sound field practices.
3. **Water:** Remedial actions may also involve consumption of significant amounts of water for treatment processes and typically need management of surface water. Green remediation strategies focus on reducing water consumption, reusing treated water, and using efficient techniques to manage and protect surface water and groundwater.
4. **Materials and Waste:** Site remediation may require significant amounts of raw materials and sometimes generates its own hazardous and non-hazardous wastes, including materials and debris that often are shipped offsite. Green remediation strategies offer opportunities to reduce materials consumption and waste generation,

use recycled and local materials, and spend products, and purchase environmentally preferred products.

5. **Land and Ecosystems:** Superfund sites often involve degraded onsite and offsite ecosystems and may have conditions that make the site unsafe for human or other use. But they also may occur in the vicinity of ecosystems and natural resources with varying degrees of integrity. Green remediation strategies focus on protecting ecosystem services during site cleanup; minimizing further harm to the area; protecting land resources and ecosystems at or near the site; and fostering the return of sites to ecological, economic, social, or other uses.

1.3.2 Methodology for Understanding and Reducing a Project's Environmental Footprint

In April 2012, EPA published *Methodology for Understanding and Reducing a Project's Environmental Footprint* (EPA 2012), intended to provide a methodology for footprint analysis conducted on behalf of EPA and for use by EPA in evaluating footprint analysis results submitted by other parties under any cleanup program. This guidance document introduces a detailed process to quantify materials, waste, water, energy, and air metrics that represent the environmental footprint of activities involved with contaminated site cleanup consistent with the earlier defined core elements of green remediation. Quantifying these metrics can serve as an initial step in reducing the remedy footprint by identifying the larger contributors and developing targeted potential approaches to reducing those contributions.

1.3.3 Other Guidance Documents

A number of green remediation reference sheets providing specific BMPs and technologies for various aspects of remedial actions are available at http://www.cluin.org/greenremediation/docs/GR_factsheet_topics_update.pdf), and include the following:

- Excavation and Surface Restoration (EPA 542-F-08-012, December 2008)
- Site Investigation (EPA 542-F-09-004, December 2009)
- Pump and Treat Technologies (EPA 542-F-09-005, December 2009)
- Bioremediation (EPA 542-F-10-006, March 2010)
- Soil Vapor Extraction & Air Sparging (EPA 542-F-10-007, March 2010)

- Clean Fuel & Emission Technologies for Site Cleanup (EPA 542-F-10-008, August 2010)
- Integrating Renewable Energy into Site Cleanup (EPA 542-F-11-006, April 2011)
- Sites with Leaking Underground Storage Tank Systems (EPA 542-F-11-008, June 2011)
- Landfill Cover Systems and Energy Production (EPA 542-F-11-024)

1.4 Green Remediation Approach for the Jorgensen Forge Early Action Area

Opportunities for the incorporation of green technologies and practices consistent with EPA's green remediation strategy were considered for the project to the extent practicable. While the principles of green remediation are intended to help achieve the cleanup goals and objectives of a project by reducing the environmental footprint of the remedial action, protecting human health and environment remains the primary goal and the determining factor in the remedial action decision making process. Therefore, green remediation strategies are applied without "compromising cleanup objectives, community interests, the reasonableness of cleanup timeframes, or the protectiveness of the cleanup actions" (EPA 2009c).

The following green technologies and practices to reduce total energy use, reduce air pollutants and GHG emissions, reduce water use, and improve materials management and waste reduction efforts may be incorporated into the planned project:

- To reduce GHG emissions from equipment and machinery used during construction, requirements for use of cleaner fuels and emission reduction BMPs will be added to the Contractor specifications, as provided in this document. BMPs required will include careful scheduling of construction sequencing to minimize equipment idling, and maintaining equipment to operate at optimum efficiency.
- Sediment or soil transferred to the landfill will be considered for beneficial reuse or as alternate daily cover, thereby reducing consumption of resources.
- Construction debris removed from the site will be recycled to the extent practical to reduce waste generation.
- Excavated and dredged materials removed from the site will be sent to appropriate landfills; the majority of these materials are designated for beneficial reuse or

alternate daily landfill cover materials.

- Excavated on-site soil will be reused as backfill to the extent possible. However, backfill—as the main material used for the project—may also need to be imported to the extent that the soil excavated on site cannot be reused. Locally produced backfill materials and soil amendments would be imported to the extent practicable, reducing the length of transportation routes and associated fuel consumption and GHG emissions.
- Environmental Management System (EMS) practices such as reducing the use of paper by moving to fully electronic transmittal of project documents and implementation of waste reduction and recycling programs at all work sites will be incorporated into the project. Electronic submittals for the documents under this project will be used to the extent practicable, minimizing consumption of paper for copies and submittals. Furthermore, electronic communication, documentation, and filing will be utilized as much as possible during the course of construction.

Other green remediation strategies were considered for implementation, but deemed not applicable or not practicable, including the following:

- **100 percent use of renewable energy (green power):** Jorgensen Forge Corporation (Jorgensen Forge) and Earl M. Jorgensen (EMJ; herein referred to collectively as the Owner) support the use of renewable energy. However, this project does not include permanent installation or long-term operation of any equipment, so the use of green power and energy-efficient equipment does not apply to this project.
- **Cleaner fuels, diesel emissions controls, and retrofits:**
 - **Industrial material reuse or recycling within regulatory requirements:** The Owner supports reuse and recycling of industrial materials. However, this project does not involve use or decommissioning of industrial materials.
 - **Concrete made with coal combustion products replacing a portion of traditional cement:** No new concrete surfaces are proposed for this project; therefore, no cement is expected to be used for the project.
 - **Methane recovery from landfills:** This project is not near any landfills where methane gas is recovered and could be put to use by the project.

- **Greenhouse gas emission reduction technologies:** The project does not involve installation or permanent use of boilers, diesel generators, or other on-site combustion sources, so this item is not considered applicable to the project.

As noted in the Clean and Green Policy, EPA Region 10 intends to measure the cost differentials and environmental benefits associated with implementing the policy. Examples include, but are not limited to, tracking quantities of materials reduced, reused, or recycled; reductions in carbon or GHG emissions; and the quantity of water conserved or replenished. To support this effort, the Removal Action Completion Report will include a summary of actions implemented consistent with the Clean and Green Policy.

The following specifications will be included in the construction contract, or in a construction contract amendment:

1. **Green policy:** The Contractor shall use practices that are sustainable in accordance with EPA Region 10 Greener Cleanups. The Contractor shall report on the use of these practices, including the associated quantities of materials reduced, reused, or recycled as a direct result of these practices, for all removal action activities conducted under this contract after project completion.
2. **Cleaner fuels, diesel emissions controls and retrofits, and emission reduction strategies:** For non-marine diesel-powered equipment exceeding 50 horse power (hp) that needs to be rented, the Contractor will utilize construction equipment rented from a local supplier whenever possible, and will request the rental of construction equipment meeting Tier 4 standards. If Tier 4 construction equipment is not available, equipment will be requested that meets at least the Tier 3 standards. If equipment meeting Tier 4 or Tier 3 standards is not available, then other equipment may be considered if emission devices, such as oxidation catalysts and/or particulate filters, are added. Equipment with a higher tier emission standard will not be used if selecting the higher tier would result in use of larger equipment that would use more fuel or result in a higher rate of emissions. Contractor-owned diesel-powered equipment exceeding 50 hp shall meet Tier 4 or Tier 3 standards. If Contractor-owned equipment meeting Tier 4 or Tier 3 standards is not available, then other equipment may be considered if emission devices, such as oxidation catalysts and/or particulate filters, are added. Equipment with a higher tier emission standard will not

be used if selecting the higher tier would result in use of larger equipment that would use more fuel or result in a higher rate of emissions.

3. **Clean fuel:** Cleaner fuels will be used in all diesel-powered equipment. Diesel fuels to be used may include biodiesel blends (e.g., B5 or B20) or ultra-low sulfur diesel.
4. **Greenhouse gas emission reduction technologies:** Diesel-powered equipment should be used where available instead of gasoline-powered equipment. The Contractor shall minimize idling to control air pollution and reduce fuel usage. Procedures to minimize idling shall include turning off all non-marine diesel engines on construction equipment greater than 50 hp when not in active use.
5. **Water conservation and efficiency:** If water consumption is necessary (e.g., for dust suppression), water conservation measures will be utilized where feasible.
6. **Construction material reuse or recycling within regulatory requirements:** Where feasible, the Contractor shall recycle all scrap construction materials, wastes from the construction trailer, and other materials generated during the course of construction activities.
7. **Environmentally preferable purchasing:** Where available, all materials purchased will be post-consumer recycled.
8. **EMS:** Practices such as reducing the use of paper by utilizing electronic transmittal of project documents and implementation of waste reduction and recycling programs at the work site shall be implemented.
9. **Local materials and supplies:** The Contractor shall purchase and use local materials (such as asphalt and backfill material) where available.

2 REFERENCES

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- EPA, 2012. *Methodology for Understanding and Reducing a Project's Environmental Footprint.* Office of Solid Waste and Emergency Response. February 2012.